

Spauligodon goldbergi sp. n. (Nematoda: Pharyngodonidae) and other Parasites of *Sonora semiannulata* (Serpentes: Colubridae) from New Mexico and Texas

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ABSTRACT: *Spauligodon goldbergi* sp. n. (Nematoda: Pharyngodonidae), a new oxyurid nematode, from the large intestine of *Sonora semiannulata* is described and illustrated. Seven of 48 (15%) adult specimens of *Sonora semiannulata* collected from Texas harbored a total of 181 specimens of *Spauligodon goldbergi* sp. n.; mean intensity was 25.9 ± 2.9 , range was 15–34. *Spauligodon goldbergi* sp. n. is distinguished from all other Nearctic species in that the female possesses a pointed tail. This is the first report of a species of *Spauligodon* from a snake. The cestode *Oochoristica parvula* and cosmoceroid nematodes *Aplectana* sp. are also reported.

KEY WORDS: *Spauligodon goldbergi* sp. n., nematode, *Sonora semiannulata*, ground snake, Colubridae.

The ground snake, *Sonora semiannulata* Baird and Girard, 1953, is a small colubrid that ranges from SW Missouri and S Kansas to N Mexico and W to Nevada and California; disjunct populations occur in other western states (Conant and Collins, 1991). The ground snake is a secretive species having a preference for spiders, with centipedes, scorpions, and insects of the orders Lepidoptera, Coleoptera, Hymenoptera, and Orthoptera being eaten in smaller percentages (Kassing, 1961). Frost (1983) provided a summary of the biology of this snake in a species account. However, nothing, to our knowledge, is known about helminth parasites of *S. semiannulata*. The purpose of this note is to describe a new species of *Spauligodon* found in the large intestine of *Sonora semiannulata* from New Mexico and Texas and to report new host and geographic distribution records on other parasites of this snake.

Materials and Methods

Between March 1986 and April 1991, 48 (22 males, 26 females) juvenile and adult (mean \pm SEM snout-vent length [SVL] = 181.0 ± 6.9 , 90–256 mm) *S. semiannulata* were collected by hand from Hood ($N = 20$), Johnson ($N = 7$), Somervell ($N = 18$), Upton ($N = 1$), and Williamson ($N = 1$) counties of Texas and San Miguel ($N = 1$) County of New Mexico. Snakes were killed within 48 hr of capture with an overdose of sodium pentobarbital (Nembutal®) and examined for parasites. Blood samples were obtained from the exposed ventricle and stained with Giemsa for examination of hematozoa. Intestinal contents and feces were examined for coccidia. Tapeworms were stained with Semichon's acetocarmine and mounted in Damar.

Nematodes were placed in undiluted glycerol, allowed to clear, and examined under a light microscope.

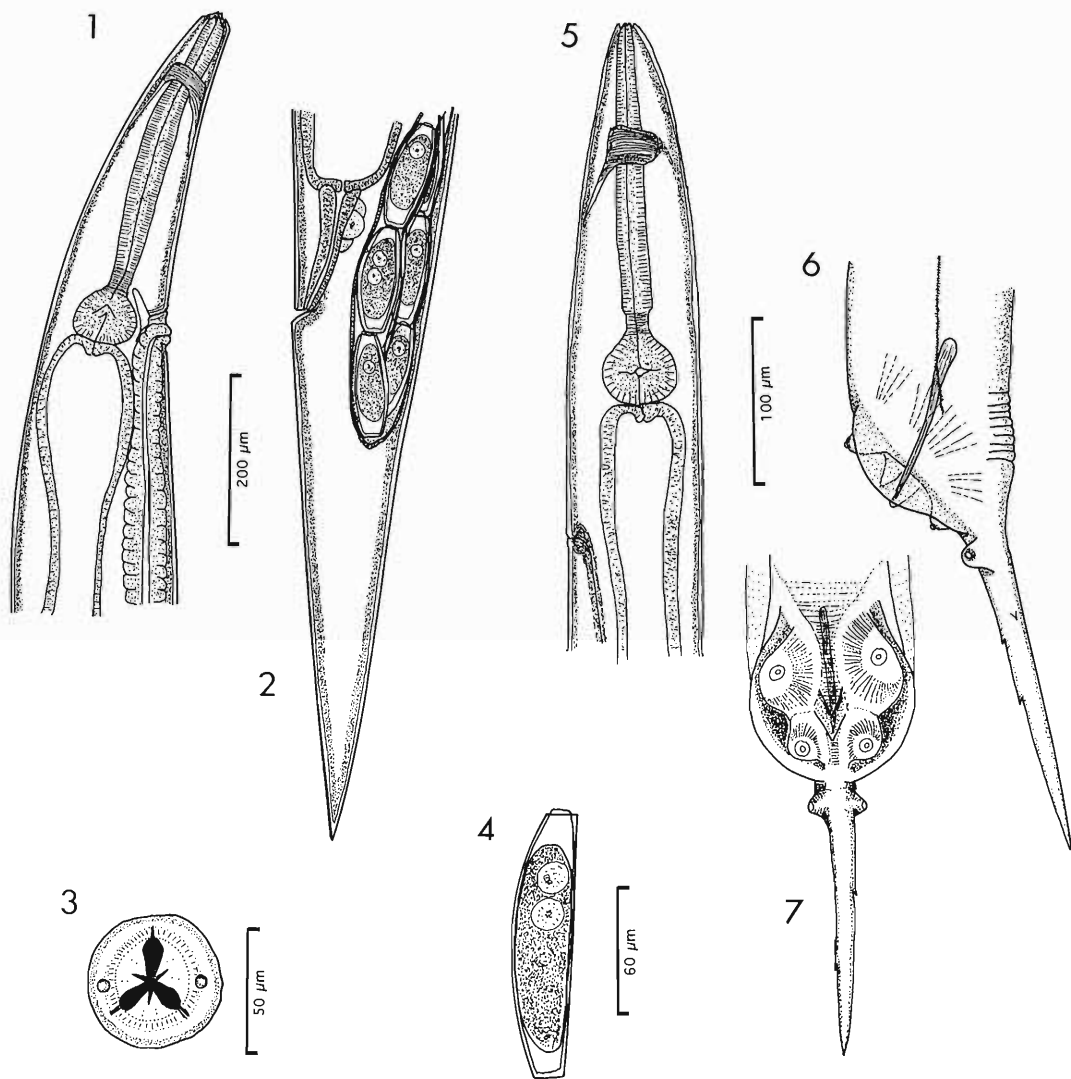
Voucher specimens of *S. semiannulata* were deposited in the Arkansas State University Museum of Zoology as ASUMZ 5949–55, 5967–68, 7712–14, 8464–65, 8485–86, 8494, 8524–29, 8619, 8643–46, 8676–80, 11753–54, 16720, 16745, 16783, 17514, 17873–76. Specimens of parasites were deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, as follows: *Oochoristica parvula* (USNPC 84397), *Aplectana* sp. (84398), *Spauligodon goldbergi* sp. n. (84518–20).

Results

Twelve (25%) of the *S. semiannulata* (7 males, 5 females, 201.0 ± 7.4 , 183–256 mm) were found to harbor parasites, including 1 (2%) with *Oochoristica parvula* (Stunkard, 1938) Stunkard, 1938, 5 (10%) with *Aplectana* sp., and 7 (15%) with an undescribed species of oxyurid nematode belonging to the genus *Spauligodon*. Blood smears were negative for hematozoa, and coccidia were not found in feces or intestinal contents. A description of the new species follows.

Spauligodon goldbergi sp. n. (Figs. 1–7)

DESCRIPTION: Generic diagnosis after Skrjabin et al. (1960). Nematodes of small size with cylindrical body tapering both anteriorly and posteriorly. Cuticle transversely striated. Lateral alae present in males and females. Mouth opening triangular, bounded by 3 lips, each with shallow midline indentation. Esophagus ends in valvulate, subspherical bulb which is separated from



Figures 1–7. *Spauligodon goldbergi* sp. n. 1. Anterior end of female, lateral view. 2. Posterior end of female, lateral view. 3. Female, en face view. 4. Egg. 5. Anterior end of male, lateral view. 6. Posterior end of male, lateral view. 7. Posterior end of male, ventral view.

esophageal body by small constriction. Excretory pore behind esophageal bulb in males. Males having caudal alae which do not envelop posterior postcloacal pair of pedunculate papillae; females having vulva in anterior half of body.

MALE (based on 10 specimens; mean measurement and range in mm): Small, white, fusiform nematodes tapering both anteriorly and posteriorly; length, 2.14 (1.84–2.47); maximum width, 0.100 (0.091–0.114). Narrow lateral alae extend from halfway between nerve ring and lips to middle of caudal alae. Cuticle with striations

of approximately 1 μm in width. Mouth bounded by 3 lips each with midline indentation producing 2 pointed lobes. One small, pedunculate amphid on each ventrolateral lip. Esophagus (including bulb), 0.296 (0.285–0.333); bulb length, 0.057 (0.051–0.068); bulb width, 0.055 (0.048–0.068). Nerve ring, 0.126 (0.114–0.137); excretory pore, 0.404 (0.357–0.510) from anterior end. Narrow caudal alae present, 0.004 (0.004–0.005) wide by 0.079 (0.074–0.091) long. Three pairs of caudal papillae present; precloacal pair situated on slightly inflated ventral surface of caudal

end, first postcloacal pair posteriolaterally directed; second postcloacal pair not enclosed by caudal alae, 0.043 (0.037–0.048) behind first postcloacal pair. Prominent genital cone in mid-ventral line consisting of small, pointed anterior cloacal lip and larger, pointed posterior cloacal lip; spicule weakly sclerified, 0.085 (0.077–0.091). Cloacal opening 0.166 (0.157–0.177) from posterior extremity. Stiff tail spike extends 0.123 (0.112–0.131) beyond second postcloacal papillae; 5 (3–7) cuticular spines.

FEMALE (based on 10 gravid specimens): Small, white, nematodes tapering anteriorly and posteriorly; length, 5.26 (4.09–6.04); maximum width, 0.200 (0.160–0.222). Narrow lateral alae extending from between mouth and nerve ring to posterior lip of anus. Cuticle with striations of approximately 1–1.5 μm width. Esophagus (including bulb), 0.430 (0.304–0.497); bulb length, 0.069 (0.051–0.081); bulb width, 0.070 (0.051–0.080). Nerve ring, 0.132 (0.125–0.154); excretory pore, 0.323 (0.239–0.382); vulva, 0.355 (0.291–0.439), from anterior end, respectively. Thick-walled muscular ovijector extends posteriorly 0.300 continuing as thin-walled vagina 0.300 joining 2 uteri, 1 directed anteriorly and the other posteriorly. Ovarian and uterine coils do not extend anteriorly as far as the esophageal bulb. Anus 1.21 (0.92–1.40) from posterior end of body. Postanal body region tapering to a point. Eggs barrel-shaped, ends truncated, operculate, 0.122 (0.111–0.131) by 0.032 (0.029–0.034), no polar adornment, no development, pronucleus stage at deposition.

TYPE SPECIMENS: Holotype. Male (U.S. National Parasite Collection, Beltsville, Maryland, accession no. 84518). Allotype: Female (84519). Paratypes (84520).

TYPE HOST: *Sonora semiannulata* Baird and Girard, 1853 "ground snake," CTM #860504–8, collected 4 May 1986, gravid adult female, 256 mm SVL, ASUMZ 5953.

ADDITIONAL HOSTS: *S. semiannulata*, 2 males, 4 females; 210.6 ± 10.1 , range 193–256 mm SVL, ASUMZ 8465–67, 8643, 8676, 8680.

TYPE LOCALITY: Somervell County, Texas ($N = 3$), 1.6 km SW Nemo off FM 200 on county road 402.

ADDITIONAL LOCALITIES: Somervell County, Texas ($N = 2$), 3.2 km SSW Nemo off FM 200 on county road 401; Hood County, Texas ($N = 1$), off FM 2174 at Fort Spunky.

SITE OF INFECTION: Rectum.

PREVALENCE: Found in 7 of 48 (15%) *S. semiannulata* in Texas. Breakdown is as follows: 1/20 (5%) Hood County, 0/7 (0%) Johnson County, 6/18 (33%) Somervell County, 0/1 (0%) Upton County, and 0/1 (0%) Williamson County, Texas; 0/1 (0%) San Miguel County, New Mexico.

ETYMOLOGY: Named in honor of Dr. Stephen R. Goldberg, Whittier College, in recognition of his contributions to reptilian parasitology.

Discussion

The general morphology of *Spauligodon goldbergi* sp. n. allows its assignment to the superfamily Oxyuroidea Railliet, 1916, family Pharyngodonidae Travassos, 1919, which currently contains 21 genera (see Petter and Quentin, 1976). Of these, 3 genera characteristic of reptiles exhibit a vulvar opening in the anterior part of the body just behind the excretory pore: *Pharyngodon* Diesing, 1861, *Spauligodon* Skrjabin, Schikhobalova, and Lagodovskaja, 1960, and *Skrjabinodon*, Inglis, 1968. These genera are separated by the relationship of the caudal alae to the genital papillae: males of the genus *Pharyngodon* have well-developed caudal alae which envelop all genital papillae; in males of the genus *Spauligodon*, the posterior pair of papillae are excluded from envelopment by the caudal alae; and males of the genus *Skrjabinodon* lack caudal alae. The inclusion of the described specimens in the genus *Spauligodon* is based upon the position of the vulva and the configuration of the caudal alae.

The genus *Spauligodon* contains species which are separated on the basis of the egg shape, tail shape, and geographical distribution (see Table 1 of Bursey and Goldberg, 1995). *Spauligodon goldbergi* sp. n. should be added to that table: Nearctic Realm; spicule length, 80–90 μm ; male tail, 3–7 spines; female tail, smooth; eggs truncated. *Spauligodon goldbergi* sp. n. belongs to the subgroup in which the males have a spicule: *S. auziensis* (Seurat, 1917), *S. azerbaijanicus* Sharpilo, 1974, *S. carbonelli* Roca and Garcia-Adell, 1988, *S. extenuatus* (Rudolphi, 1819), *S. laevicauda* (Seurat, 1914), and *S. mearnsi* (Edgerly, 1952). However, in each of these species the female possesses a filiform tail; females of *S. goldbergi* sp. n. lack a filiform tail, the posterior extremity ends in a point.

Three previously described species are found in the Nearctic Realm: *S. californiensis* (Read

and Amrein, 1953) Skrjabin, Schikhobalova, and Lagodovskaja, 1960; *S. giganticus* (Read and Amrein, 1953) Skrjabin, Schikhobalova, and Lagodovskaja, 1960; and *S. mearnsi* (Edgerly, 1952) Skrjabin, Schikhobalova, and Lagodovskaja, 1960. The female of *S. goldbergi* sp. n. differs from these 3 species in that it possesses a pointed tail; females of the other Nearctic species have filiform tails. Males of *S. californienesis* and *S. giganticus* lack spicules; the male of *S. mearnsi* has a spicule and a smooth tail, whereas the male *S. goldbergi* sp. n. has a spicule and a spiny tail. These comparisons were based on published descriptions; no type specimens were examined.

In addition to the new species, other parasites found in *S. semiannulata* are reported for the first time. Three linstowiid tapeworms fitting the description of *Oochoristica parvula* were found in the small intestine of an adult male (SVL = 200 mm, ASUMZ 16783) *S. semiannulata* collected in August 1990 from San Miguel County, New Mexico. *Oochoristica parvula* was originally described from the gecko, *Coleonyx elegans* Gray, from Yucatan, Mexico (Stunkard, 1938). Measurements of *O. parvula* from *S. semiannulata* are as follows: 60–65 proglottids, 20–25 mm long by 0.68–0.77 mm wide, scolex 240–250 μ m, suckers 70–86 μ m, testes number 20–30, testes diameter 20–28 μ m. These measurements are within the ranges of those provided by Stunkard (1938).

A total of 11 male cosmocercoid nematodes, *Aplectana* sp. were found in the rectum of 2 adult (male and female, 188–208 mm SVL, ASUMZ 8465, 8559) *S. semiannulata* collected in Hood County, a single adult male (157 mm SVL, ASUMZ 11754) collected in Johnson County, and 2 adult males (190–202 mm SVL, 8644, 8677) from Somervell County, Texas. Mean intensity was 2.2 ± 0.73 (range 1–5) worms/host. These nematodes possessed simple papillae in what appeared to be 2 rows of 8. The body, spicule, and gubernaculum length and shape appeared most similar to *Aplectana itzocanensis* Bravo Hollis, 1943. However, without females, specific identification was not possible. *Aplectana* spp. have

been reported primarily from amphibians worldwide (Baker, 1987).

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